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# Awareness and the classical conditioning of attitudes.

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AWARENESS AND THE  
CLASSICAL CONDITIONING OF ATTITUDES

A Thesis - for Master's Degree Presented

By

David King

Submitted to the Graduate School of the  
University of Massachusetts in partial  
fulfillment of the requirements for the degree of

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1975

Psychology


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CLASSICAL CONDITIONING OF ATTITUDES


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## INTRODUCTION

An important problem in the study of attitudes is how attitudes are acquired. One approach is that of applying the principles of learning theory to attitude formation. It is generally agreed that most, if not all, attitudes are learned. Perhaps one's attitude toward sweetness in general is physiologically determined, but certainly one's reactions to most attitude objects are not innate. So if attitude acquisition can be placed within the broad conceptual framework of learning theory, what is the mechanism involved? An attempt to answer this question has been advanced by Staats and Staats (1957, 1958) in terms of a classical conditioning model of attitude formation. Certainly, this approach is only one of many possible conceptualizations within the learning framework. Alternative interpretations of their data rely on a more cognitive problem-solving explanation (Cohen, 1964; Page, 1969).

Staats and Staats (1957) have extended the thought of such psychologists as Cofer and Foley (1942), Mowrer (1954) and Osgood (1952) in a study of the classical conditioning of meaning. Following Osgood, they view meaning as an implicit detachable component of the total response to an object. That is, meaning is one part of the response to an object, and like any other response, can be classically conditioned. Words can be considered the signs of objects,

and they elicit a part of the total response to the object itself. Affective meaning is a portion of the response to a word. Staats and Staats theorize that if meaning is a detachable response elicited by a word, then it should be possible for the meaning response to be classically conditioned to any continuously presented stimulus. So a nonsense syllable followed by a word should be slightly conditioned by the meaning component of the word. For example, YOF followed by the word "happiness" would result in the meaning of happiness being weakly conditioned to YOF. Since a single pairing may not result in empirically measurable conditioning, Staats and Staats felt multiple pairings would be necessary to obtain strong conditioning. These multiple pairings could not be with the same word, since direct association of the word and syllable could then explain the results. Instead, different words with the same or similar meaning components can be used, since these common components will strengthen conditioning, while the other components of the meaning response will differ and, according to Staats, actually inhibit each other. Thus, YOF could be consecutively paired with happiness, pretty, and sweet (Figure 1). The initial pairing would result in YOF being conditioned weakly to  $r_{pv}$  (the positive value meaning response to happiness), and  $R_H$  (all the other components of the meaning response to happiness). The second pairing results in the  $r_{pv}$  bond being strengthened

since it has occurred twice, and the  $R_P$  responses tend to weaken the  $R_H$  bond. The third pairing results in further strengthening of the  $r_{pv}$  bond and again  $R_S$  serves to inhibit  $R_H$  and  $R_P$ . This assumes that  $R_H$ ,  $R_P$ , and  $R_S$  have no systematic meaning components in common. The net result is that YOF is conditioned to elicit  $r_{pv}$ .

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 Insert Figure 1 about here  
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To test this hypothesis, Staats and Staats (1957) designed the following experimental procedure, which has been used in most subsequent studies. The conditioned stimuli were six nonsense syllables, and the unconditioned stimuli were words possessing a common evaluative meaning. That is, the unconditioned stimuli words were all of either positive or negative evaluative meaning. A number of filler words were also employed in the procedure which were of neutral evaluative meaning. One syllable was always paired with words of positive evaluative meaning, one with words of negative evaluative meaning, and the remaining four were paired with words of neutral or unsystematic meaning. There were 108 trials, 18 for each nonsense syllable. The trials were arranged unsystematically, except that no nonsense syllable appeared in more than two consecutive trials.

Subjects were told they were engaged in two simultaneous learning tasks, visual and auditory. That is, they

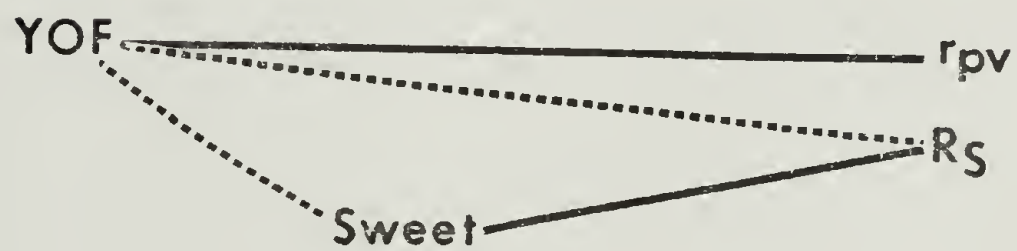
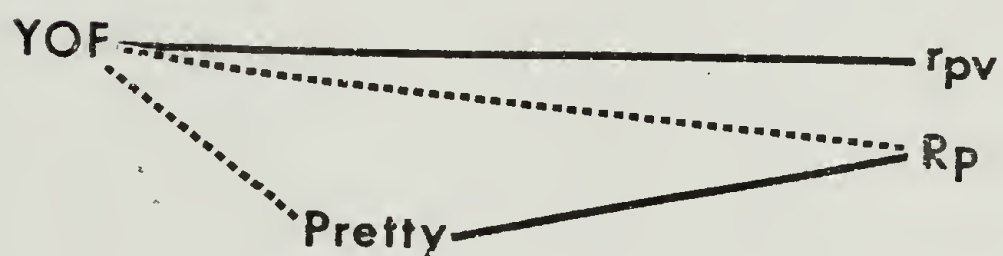
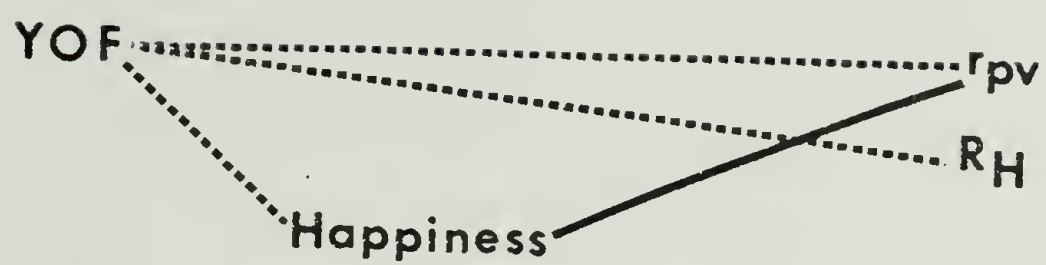


Figure 1

Conditioning of Meaning (from Staats and Staats, 1957)



were given a visual learning task, followed by an auditory learning task. During the actual conditioning phase, the nonsense syllables were projected onto a screen by means of a slide projector, and the words were presented orally by the experimenter one second after the slide appeared on the screen. Subjects were instructed to repeat the word aloud and then to continue to repeat the word silently to themselves. When the conditioning was completed, the subjects were asked to write down all the syllables they recalled and to rate the syllables on a pleasant-unpleasant semantic differential scale. Awareness of the relation between the syllables and the words (contingency awareness) was assessed by asking the subjects to "write down anything you thought about the experiment, especially anything you thought about the purpose of the experiment while you were participating in the experiment." Subjects indicating contingency awareness were excluded from the analysis. Nine of 86 subjects were classified as aware on the basis of the postexperimental question and were removed before the data was analyzed.

Staats and Staats based their conditioning of meaning on Osgood and Suci's (1955; in Staats and Staats, 1957) work on the components of meaning. Osgood and Suci found that a large part of the variance in the judgment of meaning could be accounted for by three factors: evaluation (good-bad), potency (strong-weak), and activity (active-passive). In this study, these three components of meaning were separately

conditioned to three experimental groups. Significant conditioning of evaluative meaning was found ( $p < .001$ ), as well as for activity and potency.

Staats and his colleagues have since replicated and extended this work in the classical conditioning of attitudes. Nonsense syllables were chosen in the original study since they are presumably devoid of significant meaning, and would hence be easier to condition. Staats and Staats (1958) also carried out the evaluative conditioning paradigm described above with men's names or national names as the conditioned stimuli. Of the 93 subjects run, 17 were found to be aware of either or both of the systematic name-word relationships and were excluded from the analysis. Results for men's names showed a significant effect for conditioned attitude ( $p < .01$ ), and the difference for national names was also significant ( $p < .05$ ). The implication of interest here is that if Staats is correct in his interpretation of these results as unaware learning of an attitude response, then his conditioning procedure must be fairly powerful to alter established attitudes as in the case of national names. While nonsense syllables can be expected to be fairly malleable in evaluative meaning, it is perhaps surprising that a few massed trials can significantly change an attitude presumably fairly stable.

A study by Staats and Staats (1959) is of relevance for this problem. They studied the effect of the number of

conditioning trials on evaluative conditioning of nonsense syllables and found that as few as eight trials resulted in significant conditioning ( $p < .05$ ).

Staats, Staats and Heard (1959) found significant semantic generalization of meaning of two evaluatively conditioned words to their synonyms. The words carpet and rock were conditioned, and then subjects rated their synonyms rug and stone on the semantic differential scale. Only two of 163 subjects were aware that pleasant or unpleasant words were systematically paired with carpet and rock, and none were aware of the synonym relationship. Significant generalization of conditioned meaning of a word to a word of similar meaning was found.

All the above research involves higher-order conditioning, since words themselves are presumably conditioned in meaning. The first-order conditioning of evaluative meaning to a nonsense syllable, and the accompanying GSR conditioning, was assessed by Staats, Staats and Crawford (1962). For this study, shock and loud noise served as the unconditioned stimuli (UCS). For purposes of later analysis, it is necessary to discuss the procedure in some detail. The verbal stimuli were the conditioned stimulus (CS), a generalization of meaning test word, and 23 filler words. "Large" was the CS, and "big" was used to test for generalization. A random list of 77 words was used with "large" presented 14 times, "big" once, and the rest filler

words. The subject was told that the experiment concerned the effect of shock and noise as distractors in a learning task. The CS was followed by a shock or noise on nine of the 14 presentations of the CS, while in the control group the UCS were also presented nine times, but always after a filler word. The control group can thus be viewed as an explicitly unpaired control (Rescorla, 1967). Following the conditioning procedure, subjects were given the semantic differential to rate six of the words including the CS and generalization words. A four-question apparently oral interview was then conducted to assess awareness, which included the question "Did you anticipate the sound or shock in any way?" Of the 28 subjects in the experimental group, 21 were aware that 'large' was often followed by a noxious stimulus, but only two saw any relation of this to the semantic differential rating. It is not explicitly stated that no subjects were excluded from any of the analyses performed because of some degree of awareness, but it appears that none were. Significant GSR conditioning was found for the CS ( $p < .01$ ), although not for the generalization word. The CS was also rated more unpleasant than the neutral words ( $p < .0005$ ), but again no generalization occurred to the synonym.

This study is open to criticism on several grounds. First, the CS is presented 14 times while the other words apparently appeared only 2 or 3 times. This alone distin-



guishes the CS from the filler words and therefore may increase contingency awareness. Secondly, the use of the explicitly unpaired control design may also elicit greater awareness. Only the CS is followed by noxious stimuli; and if one is attending to the repeated CS, it is relatively easy to discern the connection between the CS and the UCS. Of course, Staats found 21 of 28 subjects to be contingency aware, although not aware of the connection between the contingency and the rating of the semantic differential. This type of awareness, awareness of the experimental hypothesis, has been labeled demand awareness (Orne, 1962). Demand awareness in this case implies contingency awareness, since one must know the contingency in order to understand its relation to the rating scale.

Here it is not clear if the higher rate of awareness is not also due to the more extensive questions following the experiment as well as the experimental procedure itself. An alternative interpretation of the GSR data is that it can also be explained in terms of cognitive processes rather than classical conditioning. That is, since most subjects were aware of the relation between the CS and the noxious stimuli, it is not surprising that the presentation of a stimulus that signals a shock or loud noise may induce anxiety or fear or thoughts resulting in greater arousal. Some researchers view GSR conditioning as cognitively determined (Baer and Fuhrer, 1968; Baer and Fuhrer, 1970),

while others stress the role of cognition in the conditioning (Grings, 1973).

So the presentation of the CS may in no way elicit a simple involuntary response, but instead may elicit thoughts of the impending aversive stimuli. It would have been of interest to have the GSR data analyzed separately for aware and unaware subjects, but this was not done. This explanation is consistent with both the contingency aware and the demand aware positions, to be more fully explicated below. Perhaps this cognitively mediated model can still be considered classical conditioning, but it is not what Staats intended in explaining his results. If the response is cognitively mediated, it is not unexpected that no generalization will occur to a word of similar meaning. An interesting test would have been to tell subjects that "large" would no longer be followed by noxious stimuli, but that another word would. An immediate shift of the GSR response may have occurred, as was found by Wilson (1968, in Grings) in a similar GSR conditioning task.

Cohen (1964) investigated the possible role of contingency awareness in being responsible for the conditioning by replicating Staats and Staats' procedure, with the following differences. The experimental group scaled on the semantic differential the six nonsense syllables and also three that were not presented previously, and a control group scaled all nine syllables without undergoing the conditioning

procedure. Results showed a "general tendency to rate all six syllables used in the conditioning procedure towards the pleasant end of the scale." This was not true for the control group. This result could conceivably be due to a familiarity effect (Zajonc, 1968). Of the two conditioned syllables, YOF was consistently rated more pleasant than XEH, probably due to pronunciability (Underwood and Schultz, 1960). A modified form of Staats and Staats' awareness question was used, as subjects were asked to "write down anything you thought about the experiment, especially anything you thought about the purpose of the experiment" (Staats, 1969). Using a loose criterion of contingency awareness (1 or more of 3 judges classifying a subject as aware), Cohen found 45 subjects unaware of the contingencies and 52 subjects aware. This is a much higher rate than Staats and Staats usually obtain, yet a comparison of Staats and Staats' (1957) overall ratings (without aware subjects) and Cohen's ratings (with aware subjects) showed great similarity. Cohen found highly significant conditioning for all subjects ( $p < .001$ ), but no effect when aware subjects were removed.

Insko and Oakes (1966) manipulated four independent variables in an investigation of the role of awareness in the classical conditioning of attitudes. These were evaluation (positive or negative conditioning), color naming (present or absent), percentage of reinforcement (50 or 100)

and extinction trials (0, 15, or 30). They examined both contingency awareness and demand awareness. Instead of using the Staats and Staats procedure, subjects were run individually, with only three nonsense syllables used. Color naming between trials was used to interfere with contingency awareness, but presumably not conditioning for half the subjects. Contingency awareness was assessed through a seven-question scale, with an eighth direct question assessing awareness of the demand characteristics. The major findings were that conditioning was significantly correlated with both contingency and demand awareness for the no-color naming group, but only for the contingency aware in the color-naming group ( $p < .01$ ). Subjects unaware of the contingency did not condition, but subjects unaware of the demand characteristics did condition. Insko and Oakes thus interpret their results in terms of contingency awareness rather than unaware conditioning or demand awareness. Awareness of the contingency causes the subject to see the CS as symbolic of a concept. In this case, for example, YOF may come to stand for the concept good or pleasant, so subjects are not just cooperating in rating YOF pleasant. Insko and Oakes see this rating as representing a cognitive change in symbolic reference to affect, not in an actual affective change.

Page (1969) hypothesized that the Staats and Staats conditioning phenomenon was purely a function of demand



awareness. According to his interpretation, the subjects became aware of the contingency between the syllables and the words. Then utilizing cues provided in the experiment such as the association patterns and being asked to rate the syllables on a pleasant-unpleasant semantic differential scale, they became aware of the experimenter's hypothesis or, at least, aware of what the experimenter wanted them to do. Most such subjects then cooperated and rated the syllables very strongly in the correct direction. Page manipulated three variables in a replication of Staats and Staats' procedure. Psychological sophistication of subjects (beginning versus end of semester), difficulty of interlist association (2, 4, or 10 filler syllables), and direction of conditioning were all varied.

It was believed that subjects knowing about conditioning might be in a better position to respond to demand cues. Likewise, it was felt that the addition of filler syllables would make the pattern less obvious and so lead to less conditioning with more filler items, and more conditioning with less items. Of course, number of conditioning trials remained constant. Following the conditioning procedure, subjects filled out a 17 question postexperimental questionnaire to assess contingency awareness and demand awareness. Results showed a strong conditioning effect for all subjects combined ( $p < .001$ ), a significant sophistication effect ( $p < .05$ ), and a significant effect for interlist

difficulty ( $p < .05$ ). Page found that the best predictor of conditioning was demand awareness, not contingency awareness. For subjects identified as contingency aware but not demand aware, conditioning was not significant. Page found a basically bimodal distribution on rating the syllables, the demand aware subjects rating them strongly, the rest rating them near the mid-point.

Staats (1969) replied to his critics, claiming these results were "not crucial challenges to the author's learning theory of attitudes, or to the experimental methods of the author." For example, the bimodal distribution which Page found could be due to some subjects who follow the instructions, and some who do not attend or engage in interfering strategies. The sophistication finding could be due to later subjects being informed of the study by earlier subjects. The addition of filler items not only makes the task less obvious, but also increases the boredom inherent in the task and hence inattention. A viable point raised by Staats is that Page's questionnaire essentially programs the subject into awareness. Each question teaches the subject that he has been deceived, and that he should have noticed a pattern of association. In a sense, the questionnaire may have a demand characteristic of its own. For what subject likes to admit that he has been fooled? According to Staats, if the subject can recall just a few items he can figure out the "right" answer. Similarly,

in Cohen's study, an essential part of the question Staats used was dropped--"while you were participating in the experiment." Staats argues that simply rating the syllables causes some subjects to become aware when they encounter the question on awareness, even though they were not aware at the time of rating. At issue is whether subjects see a pattern in the procedure and cooperate, or whether they are conditioned and then the conditioning leads to awareness. A subject successfully conditioned may not need much help in becoming aware of why he likes a certain syllable.

Page (1974) carried out two studies in which he attempted to manipulate aware subjects. In the first study, he used the Staats procedure up to the point of rating the syllables. The control group then continued in the Staats procedure, but in the reversal group, Page asked subjects who had "caught on" to the associations between the lists to rate the syllables in the opposite direction to that direction they were supposed to, but only for the two syllables for which subjects found a consistent pattern. If the subject was not aware of a pattern, he was to ignore the instruction and rate the syllables according to his feelings. Results showed a switch of conditioning direction in the reversal group as compared to the control group, even though both were conditioned in the same direction. In the second study, subjects were instructed to associate between the slides and words, and they showed a large increase in con-



ditioning. In neither study above did Page carefully examine the contingency aware-demand unaware subjects as compared to the unaware subjects, but this turned out to be unnecessary since only subjects who were demand aware exhibited conditioning. Staats would probably criticize these studies for reasons similar to those in his 1969 paper. In the first study, subjects are told more is going on than what they may have been aware of, and they may then reflect and figure out the source of their affect. In the second study, an increased rate of awareness was correlated with increased conditioning. Staats is cognizant of this fact and tries to remove aware subjects.

Recently, O'Donnell and Brown (1973) have studied the classical conditioning of attitudes of children from 8 to 18. Staats and Staats' general procedure was followed, and demand and contingency awareness were assessed by means of a series of 5 open-ended questions asked in a post-experimental interview. It was found that contingency awareness and not demand awareness was the best predictor of conditioning scores, in agreement with Insko and Oakes (1966). Also found was that increasing age was accompanied by increasing conditioning scores. This finding may be due to the difficulty younger children may experience in paying attention to a boring task for a period of time. Also, the UCS words were not reported, but presumably they were the same as those used by Staats and Staats (1957). If so, they



may have differing meanings and differing impacts at different age levels.

The contingency awareness finding and the increasing age association with greater conditioning may both be related to the difficulty younger children may have in telling an adult experimenter in an oral interview that he was misled as to the purpose of the experiment. So demand awareness may possibly have accounted for the ratings better than contingency awareness, but one can't tell because of the nature of the assessment and the subject population.

Staats, et al. (1972) have continued research along the lines of Staats' earlier work. Having extended his theory of attitudes into what he terms attitude-reinforcer-discriminative theory, he tested it by conditioning food-meaning to a nonsense syllable. Three nonsense syllables were used, two paired with neutral words and one paired 12 of 16 trials with food words. The other four trials were with neutral words. As hypothesized, food-deprived subjects rated the syllable more pleasantly than satiated subjects. Two indirect questions were used to assess awareness, rather than one as was previously done. Again, of course, a demand characteristic explanation is not eliminated because experimental subjects were told to refrain from eating and were subsequently presented with food stimuli.

In a comparison of the effectiveness of the Staats, Insko, and Oakes, and Page methods of assessing awareness,

Page (1971) found that the responses to the Page questionnaire correlated most highly with conditioning. Page charged that the Staats question results in brief, ambiguous answers, and that the subject may not accurately interpret the question. The end result may be a number of false negatives (awares scored as not aware) who could then account for conditioning results.

Page (1973) compared the effectiveness of indirect, direct and funnel questionnaires in separating aware and unaware subjects. Funnel questionnaires begin with indirect questions and end with direct questions. Assuming that Staats' classical conditioning of attitudes results are mediated entirely by demand characteristics, he used conditioned subjects as a criterion group for awareness. The funnel questionnaire was found to be the most accurate in identifying these individuals. Unfortunately, the assumption results in data not meaningful to those who disagree with it. If Staats' contention that some conditioned but contingency unaware subjects are led to awareness by the questionnaire is correct, then Page's results are not necessarily damaging. Page's questionnaire could merely be the most efficient in programming awareness.

In summary, then, there are three basic positions in regard to what actually occurs in the classical conditioning of attitudes procedure. First is Staats' position that automatic conditioning is occurring without awareness.

Classical conditioning of evaluative meaning to a nonsense syllable occurs through repeated pairings with words having a common evaluative meaning component. Staats is dealing with a conditioned reflex, not a conscious concept. Thus the presentation of YOF, for instance, comes to elicit stronger and stronger evaluative meaning responses over conditioning trials.

Second is the position that contingency awareness is necessary for conditioning, but not demand awareness. That is, the subject gradually becomes aware that a certain nonsense syllable is always followed by words of a common evaluative meaning. The nonsense syllable thus comes to stand for a concept. Subjects aware of the concept will therefore rate the syllable in the evaluative direction of the concept, even without being aware of the demand characteristics.

The third position is that both contingency and demand awareness are necessary. Subjects must correctly form the concept of evaluative meaning, and know that the experimenter expects ratings of the syllables to be in accord with the evaluative meaning.

The resolution of these three positions hinges on the method of assessing awareness. Staats claims his method is efficient in identifying aware individuals, while Page's questionnaire suggests awareness to the subjects. Page argues that Staats' method results in a number of false

positives, and that these false positives were just the ones who were indeed conditioned. The remaining unaware subjects did not follow instructions, and thus did not condition. The present study dealt mainly with the Staats and Page positions, although the contingency-aware-only subjects were identified by utilizing Page's assessment technique. The purpose of the experiment reported here was to give a fair test to the two theoretical positions of Staats and Page, and to determine which of two positions best fit the data.

Three experimental and a control group were run. The direction of evaluative meaning conditioning was made into a between-subjects variable because of the desire to keep the running of the experimental groups reasonably short in duration. So the basic design was a 2 x 4 factorial between subjects design. The control group went through a procedure that closely followed the Staats and Staats conditioning procedure, with the only meaningful differences being the use of one evaluative conditioned syllable in a cell of 72 rather than 108 total nonsense syllable-word pairings. The number of pairings of the syllable to be conditioned and evaluative words was 18 as in Staats and Staats. Following the semantic differential ratings of the syllables and the recall tests of words and syllables, subjects were given the Staats question on awareness. When they completed this they filled out a modified form of the Page questionnaire. It



was expected that both the Staats and Page findings would be replicated in the control group. That is, when subjects judged aware on the basis of the Staats question were removed, significant conditioning would remain. However, when subjects judged contingency aware or demand aware were removed, no conditioning effect would remain.

The first experimental group was the counterconditioning group. Here the control group procedure was followed except for the actual conditioning procedure itself. The conditioning procedure was first done for the opposite evaluative direction as in the control group, and then repeated in the same direction as in the control group. Subjects rated on the semantic differential the conditioned syllable based on their feelings during the second part. According to Staats, it was expected that counterconditioning would result in less conditioning than the control group for unaware subjects. This is because of the  $r_{pv}$  and  $r_{nv}$  (negative value) bonds tending to inhibit each other resulting in a washing out of the effect. It is not known whether a primacy, recency or neutral effect would occur, but the crucial point is that any conditioning would be weaker than the control group. Staats cites counterconditioning in behavior therapy as "a verification of the classical conditioning theory of attitudes" (1969).

For Page's position, it would be expected that the first time through the list would lead some subjects to

awareness, who would then attend to the second part because they knew more is going on than what they were informed. In the second part, additional subjects who were not aware in the first part may see the pattern, resulting in greater conditioning. Since Staats fails to remove all the aware subjects according to Page, then after subjects aware on the Staats question are taken out, greater conditioning should remain in this group than in the control group.

One possible problem with the counterconditioning group is that a phenomenon similar to the reversal shift phenomenon found in operant studies (Kendler and Kendler, 1969) may result in a sudden swing from one direction of conditioning to the other. Then Staats and Page would have identical predictions. Although it is not clear that this would happen, an experimental group was included to avoid any possibility of a reversal shift while still testing the above expectations. In the concept formation group, subjects first were conditioned in the same direction as in the control group but with a filler syllable being conditioned. Then the target syllable was conditioned in the second part in the same direction as the first part. According to Staats, it was expected that this group would condition to the same degree as the control group, or perhaps a little less due to possible conditioning of neutrality on the first part. The demand characteristic position would predict greater conditioning in the concept formation

group than the control, for the same reason as for the counterconditioning group.

The third experimental group, labeled the balance group, again had two conditioning parts. In the first part, the nonsense syllables all had an equal number of pairings with evaluative words, thus validating the cover story since there was no pattern to be found. In the second part, the evaluative words were paired with the target syllables. The Staats position would predict little effect on conditioning so that the balance group should approximate the control group. However, the balanced presentation should lower contingency awareness and therefore demand awareness, resulting in less conditioning in the balanced group than the control group, according to Page. The strongest test of these positions would be in comparing the balanced to the counterconditioning group, since the predictions for the two positions are diametrically opposed.

## METHOD

### Subjects

The subjects were 164 undergraduates attending the University of Massachusetts, 71 male and 93 female. The experiment was performed in the summer and fall of 1974, with subjects receiving either course credit or payment of \$2 for participating in the experiment. Both summer and fall subjects who received course credit (127) were

volunteers from the introductory psychology classes. Those who were paid were summer students who volunteered for the experiment (37). The summer introductory psychology class was too small for purposes of the experiment, so paid subjects were solicited in the summer.

### Apparatus

Slides of nonsense syllables were made with onion-skin paper and standard mounts. The slides were projected by means of a Kodak Carousel projector.

### Procedure

In general, the procedure was as close as possible to that of Staats and Staats, except for experimental manipulations. The Staats conditioning list was modified in the following ways. Since the experimental groups underwent the conditioning procedure twice, and a between-subject rather than a within-subject design was employed, the length of the conditioning presentation was cut from 108 trials to 72. The 18 pairings of YOF with evaluative words was preserved. YOF, LAJ, and QUG were each presented 18 times, while GIW and WUH were presented nine times each. The rationale for using five syllables rather than three or four, each with 18 pairings, was that on the basis of pilot testing it was believed that three syllables resulted in easy memorization of the syllables and then subjects attended to the words only, thus missing the contingency.



On the other hand, it was feared that excessively long conditioning sessions would lead to boredom and again inattention, especially in the second conditioning phase in the experimental groups. Thus a relatively short session with five syllables to learn was thought optimal to maintain attention while not causing boredom.

Subjects were run in groups of 3 to 11 in a classroom, where they were seated individually at a desk or table. The procedure for all groups was very similar, so the control group procedure will be described first. Subjects read and signed an informed consent form, which said they would be engaged in a task of learning lists of nonsense syllables and words, and also filling out questionnaires. Subjects were then given the following instructions.

You are in an experiment concerning the effectiveness of two different types of learning. One type is visual learning, the other type is auditory learning. We want to know how both these types of learning take place together - the effect that one has on the other and so on. I am going to show you a series of slides of nonsense syllables, which are meaningless combinations of three letters. You are to watch and try to remember them. When they are over, you will be asked to write down all the nonsense syllables you can recall. Please relax between the syllables and do not think of anything in particular. Are there any questions?

The nonsense syllables VAF, XAD, VEC, YIM, and GAH were then projected on the wall by the slide projector in random order, with exposure set at five seconds each. Each syllable was presented four times. At the end of

the presentation, subjects were asked to write down all the nonsense syllables they could recall.

Then subjects were given the auditory learning task of 33 words presented one time each by the experimenter with approximately two seconds between each word. Subjects were instructed as follows.

I am now going to say a series of words aloud, one at a time. After I say a word, you are to immediately repeat the word aloud, and then continue to say the word to yourself until the next word is said. Following this, you will be asked to write down all the words you can recall within 90 seconds.

The list of words used is presented in Appendix A. After the presentation, subjects were asked to write down all the words they could recall within 90 seconds. Then they were given a recognition task in which they circled one of two words for a list of 12 pairs of words, depending on which word of the pair was presented (Appendix B). Subjects were then given these instructions for the actual conditioning.

We are now going to do both tasks together. One list will be of nonsense syllables and the other will be of words. Here is the procedure. First, you will see a nonsense syllable on the wall. Then I will say a word aloud. You are to repeat that word aloud and then continue to repeat that word silently until the next slide appears. You can learn the syllables by just looking at them, since each one will be shown many times, but you should concentrate on saying the words aloud and to yourself, since there will be many words, presented only once.

At this point, the subjects underwent conditioning.

Slides of nonsense syllables appeared for five seconds. One second after the slide appeared, the experimenter pronounced a word. The list for the positive evaluative meaning conditioning control group is presented in Table 1.

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 Insert Table 1 about here  
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Table 2 provides the corresponding list for the negative evaluative meaning conditioning control group. The two lists differ only in that one list contains positive evaluative words and the second contains negative evaluative words.

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 Insert Table 2 about here  
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Following the conditioning procedure, all subjects were given a semantic differential rating booklet for the five syllables used in the conditioning procedure and one additional syllable not included. One syllable was presented on a page, along with a pleasant-unpleasant rating scale. Subjects were given the following instruction.

We would now like to know how many syllables you remember. At the same time, we would like to know how you felt about each syllable since it may have affected how you learned the syllables. Please rate the syllables based on how you felt about them during the final learning task.

Subjects were told how to rate syllables on the semantic differential scale, and were instructed to circle the

Table 1

## Pairings for Positive Conditioning

1. QUG-with	25. LAJ-leaf	49. YOF-happy
2. QUG-car	26. GIW-string	50. LAJ-into
3. GIW-pen	27. YOF-honest	51. QUG-shoe
4. YOF-beauty	28. LAJ-and	52. YOF-pretty
5. QUG-key	29. WUH-dot	53. QUG-glove
6. GIW-chair	30. YOF-smart	54. LAJ-cart
7. YOF-joy	31. YOF-rich	55. QUG-wheel
8. WUH-paper	32. QUG-line	56. WUH-on
9. LAJ-cord	33. YOF-sacred	57. QUG-dresser
10. YOF-gift	34. GIW-train	58. LAJ-trunk
11. LAJ-book	35. GIW-table	59. QUG-those
12. YOF-sweet	36. YOF-friend	60. LAJ-fork
13. QUG-letter	37. WUH-can	61. LAJ-eight
14. QUG-ink	38. LAJ-word	62. WUH-note
15. WUH-radio	39. LAJ-pencil	63. YOF-healthy
16. LAJ-four	40. QUG-clock	64. LAJ-stick
17. GIW-cup	41. QUG-of	65. YOF-success
18. QUG-five	42. YOF-valuable	66. WUH-sock
19. QUG-pot	43. QUG-ship	67. YOF-money
20. WUH-the	44. GIW-room	68. QUG-six
21. LAJ-box	45. GIW-deck	69. YOF-vacation
22. WUH-clay	46. YOF-win	70. YOF-love
23. QUG-this	47. GIW-mop	71. LAJ-water
24. LAJ-sand	48. LAJ-glass	72. LAJ-shirt



Table 2

## Pairings for Negative Conditioning

1. QUG-with	25. LAJ-leaf	49. YOF-stupid
2. QUG-car	26. GIW-string	50. LAJ-into
3. GIW-pen	27. YOF-worthless	51. YOF-failure
4. YOF-thief	28. LAJ-and	57. QUG-shoe
5. QUG-key	29. WUH-dot	53. QUG-glove
6. GIW-chair	30. YOF-sour	54. LAJ-cart
7. YOF-bitter	31. YOF-enemy	55. QUG-wheel
8. WUH-paper	32. QUG-line	56. WUH-on
9. LAJ-cord	33. YOF-cruel	57. QUG-dresser
10. YOF-ugly	34. GIW-train	58. LAJ-trunk
11. LAJ-book	35. GIW-table	59. QUG-those
12. YOF-sad	36. YOF-dirty	60. LAJ-fork
13. QUG-letter	37. WUH-can	61. LAJ-eight
14. QUG-ink	38. LAJ-word	62. WUH-note
15. WUH-radio	39. LAJ-pencil	63. YOF-disgusting
16. LAJ-four	40. QUG-clock	64. LAJ-stick
17. GIW-cup	41. QUG-of	65. YOF-agony
18. QUG-five	42. YOF-evil	66. WUH-sock
19. QUG-pot	43. QUG-ship	67. YOF-fear
20. WUH-the	44. GIW-room	68. QUG-six
21. LAJ-box	45. GIW-deck	69. YOF-insane
22. WUH-clay	46. YOF-sick	70. YOF-poison
23. QUG-this	47. GIW-mop	71. LAJ-water
24. LAJ-sand	48. LAJ-glass	72. LAJ-shirt

syllable if it was one presented during the final learning task. Next was the word recall test, in which subjects wrote down all the words they could recall within the allotted 90 seconds. This was followed by the word recognition test, in which subjects again circled one word of a pair of words for 12 pairs (Appendix C).

At this point subjects were asked to fill out a sheet of paper with the Staats awareness question at the top - "Would you write down anything you thought about the experiment, especially anything you thought about the purpose of the experiment, while you were participating in the experiment." Subjects were allowed to write as long as they wished on this measure. When all subjects in a group finished writing, the Page questionnaire for assessing awareness was given to the subjects. The questionnaire was modified in order to make it applicable to a between-subject design and so it was comprehensible to control and experimental groups. The modified version is found in Appendix D. Each question was on a separate page of a small booklet. After finishing the Page questionnaire, subjects were debriefed individually and excused.

The experimental groups all contained the entire control group procedure, but in addition each also had a different conditioning phase that preceded the conditioning procedure found in the control group. For example, the positive counterconditioning group (corresponding to the

positive control group) followed the control procedure up to and including the conditioning instructions, and then underwent conditioning as in Table 2. As can be seen, the first conditioning phase was negative conditioning. Following this negative conditioning, subjects were asked to write down all the nonsense syllables they could recall. Then they wrote down all the words they could recall within 90 seconds. Finally, a recognition test of 12 word pairs was given (Appendix C). Then the subjects were given the following instructions.

We are now going to do the final learning task. We wish to measure not only the effect of learning two lists simultaneously, but also the improvement rates from going through the lists a second time. Again, just look at the syllables, but concentrate on saying the word I say aloud and to yourself until the next slide appears.

From this point, the procedure was identical to that of the positive evaluative conditioning control group. The subjects were then given the conditioning procedure again, with the difference of positive evaluative meaning words replacing the negative evaluative words. The negative counterconditioning group simply had the order of the two lists reversed.

The concept formation group manipulation that preceded the regular conditioning phase was the pairing of QUG with evaluative words, while YOF was paired with neutral words. For the positive concept formation group QUG was paired with positive words, and for the negative concept forma-

tion group QUG was paired with negative words. Again, recall and recognition tests were given, followed by the instructions for the "final learning task."

For the balanced group, all five syllables received an equal proportion of pairings with evaluative words, randomly determined as to placement. Again, this conditioning phase was followed by the recall and recognition tests and by the instructions for the "final learning task."

### Judging

The answers to the two questionnaires were judged for awareness by two undergraduates trained by the experimenter and who were paid for their efforts. The judges were first given just the Staats question sheets and at no time saw the semantic differential ratings. Answers to the Staats question were judged as evidencing contingency awareness or no awareness. Contingency awareness was scored as being aware that YOF was paired with one or more pleasant (or unpleasant) words.

The Page questionnaire scoring followed the guidelines in Page (1969). However, judges included the answer to the Staats question in the Page questionnaire. Judges had scored all the Staats answers before beginning the Page questionnaire. They were told that it was perfectly acceptable to change their scoring on awareness for the Page questionnaire since they had additional information.



Questionnaires were scored for contingency awareness and for demand awareness. To be scored demand aware, a subject had to be contingency aware and to know that this contingency should influence the rating on the semantic differential. Subjects who were demand aware were also scored on cooperation-resistance in relation to cooperating with the experimental demand. All three judgments were made on the four-point scale used by Page. For both awareness measures, ratings were clearly aware, probably aware, probably unaware, and clearly unaware. Analogous designations were used for the cooperation-resistance measure.

## RESULTS

### Reliability

The initial ratings of awareness on the Staats question by the judges were correlated, with a resulting Pearson product-moment  $r$  of .96. Judges disagreed on only one of 164 subjects, and this subject was subsequently scored as aware by a third judge. Twelve subjects were scored as aware and 152 as unaware.

Next the reliability was computed for the Page questionnaire on contingency awareness, with an  $r$  of .82 resulting. Subjects who were classified by one judge as either clearly aware or probably aware and by the other judge as clearly or probably unaware were reclassified by the judges in a meeting in which they reconsidered their

initial judgments. Eleven subjects were reclassified in this way, resulting in 21 contingency aware and 143 unaware subjects. This procedure was also done for the demand awareness and cooperation-resistance measures. The reliability for the demand aware judgments was  $\underline{r} = .74$ , with disagreement as to the dichotomy demand aware-unaware on nine subjects. Fifteen subjects were found demand aware and 149 were not. Of the demand aware subjects nine were scored as cooperators and five as resistors, based primarily on self-ratings of the subject on the Page questionnaire.

### Initial Analyses

Because of the season (summer/fall) variable and the payment (money/credit) variable being added to the original design, it was thought useful to eliminate these variables if possible in order to increase sample sizes within cells. The effect of these factors were separately examined in terms of two dependent variables, semantic differential ratings and awareness scores. For the semantic differential ratings, mean scores were calculated for each cell in the two control and six experimental groups. Neither the season nor the payment factor was significant, although it was impossible to check for interactions because of empty cells. No consistent pattern could be found, however, that would indicate a possible interaction. Similarly, no effects were evident on the Staats awareness classification or the Page contingency awareness classifi-

cation. Because of these results, the season and payment variables were dropped from the analysis. Variables that were included in subsequent analyses were sex, experimental group, direction of conditioning and awareness.

### Semantic Differential Ratings

A  $2 \times 2 \times 4$  (Direction  $\times$  Sex  $\times$  Group) analysis of variance was performed on all subjects ( $N = 164$ ) for the semantic differential rating. Overall, a significant difference was found for direction ( $F(1,148) = 6.50, p < .025$ ), as shown in Table 3. No other effects were significant. A second  $2 \times 2 \times 4$  analysis of variance was then done after the 12 subjects who were scored as aware on the Staats question were removed. The direction effect disappeared, and again no other effect was significant. A third analysis of variance was carried out after the 21 subjects who were contingency aware on the Page questionnaire were removed (of the Staats-aware subjects, one was scored as not being contingency aware on the Page questionnaire and was re-entered into the analysis). No significant differences were found. Finally, an analysis of variance was performed on the subjects who were not demand aware on the basis of the Page questionnaire. Seven subjects who were contingency aware but not demand aware were re-entered for this analysis. Again, no significant differences were found.

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 Insert Table 3 about here  
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Table 3

Summary of the Analysis of Variance Performed on  
Two Directions of Conditioning, Two Sexes, and Four Groups

Source	df	MS	F
Direction (A)	1	23.70	6.50*
Sex (B)	1	1.76	.48
Group (C)	3	3.41	.93
A x B	1	.095	.08
A x C	3	1.911	.52
B x C	3	2.83	.77
A x B x C	3	1.69	.46
Error	148		

\*  $p < .05$



The above analyses were done on subjects on the basis of various definitions of being unaware. That is, after the initial analysis of variance, Staats-aware subjects were removed, and then Page contingency aware subjects were removed. It was impossible to perform the same analysis of variance on aware subjects because of very small numbers per cell. However, means for all groups of aware and unaware subjects are shown in Table 4. The row headings list the groups, while the column headings present the various classifications of the subjects on the basis of awareness. The cells contain the mean semantic differential ratings along with the N. The far left column presents the cell means for all subjects in the eight groups. Since a significant difference was found only for all subjects, contrasts between group means were performed to determine the source of the difference. The control group contrast was marginally significant ( $F(1,148) = 3.29$ ,  $p < .10$ ), as was the contrast for the counterconditioning group ( $F(1,148) = 2.95$ ,  $p < .10$ ). The contrast for the concept formation group was non-significant, as was the contrast for the balanced group. So no group contrast was responsible for the overall directional effect, but there was a trend for most of the difference between pleasant and unpleasant cells to be in the control and counterconditioning groups. All groups were in the predicted direction, however, and so contributed to the overall effect.

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 Insert Table 4 about here  
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In examining the Staats-aware column of Table 4, it can be seen why the significant direction effect vanished upon removal of these subjects. In general, the Staats aware subjects show extreme conditioning, and their removal attenuates the mean differences for the Staats unaware group. However, the group means are still all in the predicted direction of pleasant groups having lower mean scores than the unpleasant groups. The Page contingency aware subjects again show strong conditioning, while their removal results in virtually no difference in cell means. Obviously, there was no significant difference between the Staats-awareness cell means, but the directional patterns between cells was always in the right direction. The Page demand aware subjects, as expected, showed consistent strong conditioning. Of interest here is that when the six subjects who were contingency aware but demand unaware were included in the Page demand unaware column, the consistent directional pattern re-emerged.

These six subjects were examined separately to see how strongly they conditioned and to see how clearly they were not demand aware. Of the six subjects, two were from the pleasant control group, one from the unpleasant control group, one was from the pleasant balanced group, and two were from the unpleasant balanced group. The semantic

Table 4

## Summary of Mean Semantic Differential Ratings

(1 = pleasant, 7 = unpleasant)

	All (N)	Staats Aware (N)	Staats Unaware (N)	Page Contin- gency Aware (N)	Page Contin- gency Unaware (N)	Page Demand Aware (N)	Page Demand Unaware (N)
Control-pleasant	2.5 (24)	1.0 (3)	2.8 (21)	1.3 (6)	3.1 (14)	1.5 (4)	2.8 (20)
Control-unpleasant	3.6 (19)	6.2 (3)	3.1 (16)	6.4 (4)	2.9 (15)	6.2 (3)	3.1 (16)
Countercondition- ing-pleasant	2.5 (19)	2.0 (31)	2.6 (16)	1.0 (3)	2.8 (16)	1.0 (2)	2.7 (17)
Countercondition- ing-unpleasant	3.5 (20)	6.0 (1)	3.4 (19)	6.5 (2)	3.2 (18)	6.5 (2)	3.2 (18)
Concept formation- pleasant	3.3 (21)	--- (0)	3.3 (21)	--- (0)	3.3 (18)	--- (0)	3.3 (21)
Concept formation- unpleasant	3.9 (20)	4.0 (1)	3.9 (19)	5.5 (4)	3.4 (16)	5.5 (2)	3.7 (18)
Balanced- pleasant	2.8 (22)	2.0 (1)	2.8 (21)	1.5 (2)	2.9 (19)	2.0 (1)	2.8 (21)
Balanced- unpleasant	3.2 (19)	--- (0)	3.2 (19)	5.0 (2)	3.0 (16)	--- (0)	3.2 (19)

differential scores of the subjects in the unpleasant conditions were subtracted from eight to obtain a corrected conditioning score. That is, for all subjects a score of one indicated strong conditioning. The mean corrected conditioning score for all six subjects was 1.67, due to the most extreme ratings by all but one subject. All but one subject was rated as unaware on the Staats question, and all received ratings of clearly aware on the Page contingency awareness measure ( $\bar{X} = 1.0$ ). Mean ratings on the demand awareness measure for these subjects was 3.75, toward the clearly unaware end of the scale. In summary, these six subjects showed very strong conditioning, were not identified as aware by the Staats question, were all rated as clearly contingency aware on the basis of the Page questionnaire, but were not demand aware.

The 14 demand aware subjects were initially classified by judges on a 4-point scale of cooperation-resistance. For purposes of a t-test between cooperators and resisters, and because of the small size of the group, it was necessary to reduce the four categories to two (cooperators and resisters). This resulted in nine cooperators and five resisters. The semantic differential scores again were corrected for direction of conditioning, and a significant difference was found between the cooperators and resisters on the one-tailed t-test ( $t(12) = 1.92, p < .05$ ). The effect was in the expected direction but was surprisingly



weak, perhaps partially because of the small sample size.

### Awareness

Another dependent variable that was examined was awareness. A 2 x 4 (Direction x Group) analysis of variance was carried out on the Page contingency awareness ratings on the 4 point scale. No significant effects were found.

No analysis of variance was done on the Staats awareness data since only a two point scale was used in scoring and only 12 subjects of 164 were aware, resulting in a grossly skewed distribution. However, a chi-square test for frequency of awareness among the four groups was attempted after collapsing across direction of conditioning to increase the N. No significant difference was found, although according to Siegel (1956) the assumptions of the test were grossly violated since 50% of the expected values were under five. Twenty percent under five is the upper limit of the test.

A similar aware/unaware by group chi-square was computed for the Page contingency aware data. It was expected that certain groups should have greater awareness than others. For example, the balanced group was designed to inhibit contingency awareness, while the counterconditioning and concept formation groups were meant to enhance it. No difference in frequency of awareness was found between groups, but again the expected values assumption was vio-

lated with two of the eight cells having expected values under five.

Because of the assumption violations in these two cases, it was decided to combine the counterconditioning and concept formation groups in order to conduct the  $\chi^2$  test properly. When this was done for the Staats awareness data, 17% of the expected values were under five. Again, no significant effect was discovered. For the Page contingency measure, a weak effect was found ( $\chi^2(2) = 5.73$ ,  $p < .10$ ), with no expected value less than five. This tendency was due mainly to the disparity between the expected and observed values for the control group, with a greater frequency of aware subjects observed in this group than expected.

### Correlational Analysis

The semantic differential ratings, Staats awareness scores, Page contingency awareness scores and Page demand awareness scores were intercorrelated by means of Pearson product-moment correlations after correcting the conditioning scores. The results are shown in Table 5. All correlations were highly significant. The semantic differential ratings correlated most highly with the Page contingency awareness measure, next most with the Page demand awareness measure, followed by the Staats awareness question. This ordering of correlations was checked for significance by means of t-tests, and the following results were obtained.

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 Insert Table 5 about here  
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The semantic differential ratings' correlation with the Staats item (.23) was significantly lower than its correlation with the Page contingency awareness measure ( $t(161) = 2.55, p < .02$ ). Similarly, the correlation of the semantic differential ratings with the demand awareness measure (.29) was significantly lower than the correlation with the contingency awareness measure ( $t(161) = 2.15, p < .05$ ). The correlation of the semantic differential ratings with the Staats item was not significantly different from the correlation of the semantic differential ratings with the demand awareness measure. Thus, contingency awareness is more highly correlated with the semantic differential ratings than either the Staats awareness item or demand awareness.

The intercorrelations of the Staats awareness item and contingency and demand awareness scores are very high, as would be expected since all are measuring the same or similar things. The contingency awareness/demand awareness correlation of .80 is due to the fact that by definition all demand aware subjects are contingency aware, and all but six contingency aware subjects were scored as being demand aware. More interesting is the relation between the Staats awareness item, and the contingency and demand awareness measures. Both correlations are quite high (.64 and

Table 5

Summary of Correlations Among Four Variables

	2	3	4
1. Semantic differential ratings	.23*	.39*	.29*
2. Staats wareness ratings	---	.46*	.72*
3. Page contingency aware- ness ratings	---	---	.80*
4. Page demand awareness ratings	---	---	---

\*  $p < .001$



.72), but it was unexpected that the direction of the ordering of the correlations would be with demand awareness correlating more highly with the Staats measure than contingency awareness. After all, the Staats item was designed to assess contingency awareness, not demand awareness. To check the possibility of the difference between the correlations being significant, a t-test was performed. It was found that the Staats awareness measure was significantly more highly correlated with demand awareness than with the Page contingency awareness measure ( $t(161) = 2.23, p < .05$ ). This effect could be accounted for by two factors. First, the Page contingency awareness measure picked up more subjects as aware than did the Staats assessment. The demand aware group was comparable in size to the Staats aware group. Secondly, it was precisely those subjects that the Staats measure did not score as aware that were found as contingency aware but not demand aware. It will be recalled that of these six subjects, five were scored as unaware by the Staats assessment, and all were scored as unaware of the experimental demand.

#### Recall Test Analysis

After the data were collected and analyzed, it was decided to also check the relation of the corrected conditioning score to the recall of words. It was thought that this analysis might possibly shed some light on the failure

to replicate the results of Staats and Page. An inverse relation between number of words recalled and the degree of conditioning might indicate inattention on the part of the subjects to the slides. Perhaps they quickly learned the syllables and then mainly listened to the words, thus missing the contingency. A positive relation could best be interpreted as demonstrating attention, and then "catching on" in Page's viewpoint or conditioning in Staats' view. Analysis was done by counting the number of words correctly recalled after the conditioning procedure for the control groups. For the experimental groups, the score was taken from the number of words correctly recalled after the first conditioning phase. This was done because in this way all subjects had had only one time through the list. Results of the Pearson correlation were not significant ( $r = .07$ ), and are best viewed in terms of the crude nature of the recall measure. Certainly many variables contribute to the number of words correctly recalled other than attention. In terms of Page's model, it is the affective words that matter, and even here only one or two words necessarily are learned in order to become contingency aware. In Staats' theory, no relation is necessary. In fact, those who follow instructions best won't rehearse previous words during the presentation of a new slide. Thus, little learning of words would be expected.

### Boredom Self-Ratings

To examine the possible role of boredom in the experimental results, the answers to the final question added to the Page questionnaire (Appendix D) was used to compute cell means. The question was "How did you feel during the experiment?", and subjects rated themselves on a 7-point scale from very bored to very interested. For the positive conditioning groups, no pattern was evident, but for the negative conditioning groups, the control group was significantly less bored than the experimental groups ( $t(74) = 2.11, p < .05$ ). It is not clear why a directional difference should emerge, rather than a main effect for control groups versus experimental groups. If this difference in rated boredom for the negative conditioned groups was meaningful, it should have had some impact on conditioning scores or contingency awareness. Thus, a group by direction interaction would be expected for all subjects if, for example, boredom was mediating attention. No such interaction was found for any grouping of semantic differential ratings based on awareness, nor for the contingency awareness analysis of variance. This would seem to rule out boredom as an important factor in the results, although it does not necessarily rule out attention, which was not assessed directly.

## DISCUSSION

The results of this experiment were generally inconclusive, because the control group failed to replicate Staats' (1957) results, and the manipulations failed to have their intended effects. In terms of the first problem, the mean semantic differential ratings for the two control groups did not differ significantly after removal of the subjects classified aware on the basis of Staats' criterion. Even before their removal, with all subjects entered, the control groups differed only marginally ( $p < .10$ ). In this way, the control groups also failed to replicate the results of Page (1969). It is only when all subjects for all groups are entered into the analysis of variance that a significant direction effect emerges, but it is still less powerful than the results obtained by Page.

The second problem is related to the first. The counterconditioning and concept formation groups were intended to increase contingency awareness and demand awareness, while the balanced group was designed to decrease contingency awareness. That they did not have these effects is evidenced by the analysis of variance for the Page contingency awareness scores, by the  $\chi^2$  test for frequency of Staats awareness among groups, and the analogous  $\chi^2$  for Page contingency awareness. In the last test, a weak



tendency ( $p < .10$ ) was found for the control group to have a higher frequency of contingency awareness than did the experimental groups.

This result, along with the marginal result of the control groups contrast for the initial analysis of variance, might provide grounds for explaining the inconclusive results. Of course, as in all post-hoc explanations, speculation must be labeled as just that unless supported by evidence. If the interpretation can be made that the control group is both conditioning a bit more and becoming contingency aware more than the other groups, then two causes for this tendency can be suggested. First, the control group conditioning procedure was shorter than the experimental groups procedure. While the control group had 72 word-slide pairings, the experimental groups had 144. Staats and Page used 108 pairings. Thus, if longer slide presentations led to inattention, less conditioning would have been expected in the experimental groups, especially since this inattention would have been greatest during the crucial second time through the conditioning procedure. Of course, this factor alone would lead one to expect greater conditioning in the control group than in the Staats and Page studies. Reasons why this did not occur are discussed below.

A second possibility is related to the fact that control subjects were generally run early in the experiment,

while the experimental subjects were usually run later. It is possible that the experimenter displayed greater enthusiasm or expressiveness during the early sessions, or conversely, more boredom later in the course of the experiment. In either case, one could again postulate greater attention in the control group. Staats (1969) observed that pronouncing the positive UCS words in a positive manner and the negative UCS words in a negative manner led to greater conditioning and awareness, although it is not known if this effect extends to general expressiveness. For both of these possible explanations of results, the boredom data do not support the role of attention although no direct measure of attention was used.

If the lack of significant conditioning in this experiment was not due to boredom leading to inattention, then the possibility exists that many subjects who were truly conditioned were being misclassified as aware and thus removed from the conditioning analyses. But a comparison of awareness rates across attitude conditioning studies reveals that the present study has a clearly lower rate of awareness than other studies, as shown in Table 6. The columns list the different methods of classifying subjects as aware in the past, either by Staats' general measure of awareness, contingency awareness (omitting demand aware subjects), demand awareness, or combined contingency and demand awareness. In every category, the present study

has the lowest rate of awareness, especially so in demand awareness. If too many false positives accounts for a lack of replication and a lack of experimental effects, then a higher rather than a lower rate of awareness would be expected. Since the rate of awareness in this study is consistently lower, it seems unlikely that conditioned subjects are being misclassified. So if subjects are not incorrectly being found aware, and are not conditioning, then the conditioning procedure is having little effect.

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 Insert Table 6 about here  
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A possible reason for this is that one difference between the present control group procedure and the usual Staats and Staats procedure is that this experiment used direction of conditioning as a between-subjects variable while most other studies used it as a within-subjects variable. Thus, Staats and Staats (1957, 1958), Page (1969), Cohen (1964), and O'Donnell and Brown (1973) used a within-subjects design. Other studies using a between subjects design differed in important respects from the present study. For example, Staats, Staats, and Crawford (1962), as described above, used a procedure conducive to producing contingency awareness. Insko and Oakes (1966) used only three nonsense syllables, each with 18 pairings, while the present study used five. Thus it may be argued that the contrast between pleasant and unpleasant words within the

Table 6

Percentage of Aware Subjects in Various  
Classifications in Various Studies

	Staats Method %	Contin- gency Aware %	Demand Aware %	Total Aware %
Staats and Staats '57	10	--	--	10
Staats and Staats '58	18	--	--	18
Cohen '64	54*	--	--	54
Insko and Oakes '66	--	8	45	53
Page '69	--	6	32	39
King	7	4	9	7 or 13**

\* Modified Staats question used

\*\* Total Staats assessed awareness and total Page assessed awareness, respectively



conditioning session increases the salience of the pleasantness dimension, thereby increasing the ease of becoming contingency aware. While this factor may serve to increase awareness, it is doubtful that this should have any effect on unaware conditioning.

In spite of the general low level of awareness, subjects did become aware to differing extents and so the correlational results of the corrected semantic differential ratings and the various measures of awareness deserve discussion. As expected, conditioning was found to be highly correlated with awareness. It was not expected, however, that contingency awareness would be the best predictor of conditioning scores. This result is directly opposed to Page's correlational results, where demand awareness was found to be the best predictor. Indeed, Page's contingency aware/demand unaware subjects failed to exhibit conditioning. In contrast, in the present study the six contingency aware/demand unaware subjects showed strong conditioning. They were also judged fairly strongly as being contingency aware but not demand aware. Thus, in this experiment it must be concluded that demand awareness is not necessary for conditioning to occur, contrary to Page's conclusions. These results for contingency awareness are quite in line with those of Insko and Oakes, but these experimenters found a correlation of essentially zero between demand awareness and conditioning. The

difference between their study and the present one as well as Page's results could be due to their scoring demand awareness on a continuum where a subject was scored as more aware than a naive subject even for an incorrect hypothesis, and to the use of an oral interview which could conceivably inhibit the revelation of the hypothesis. They also failed to separate resisters and cooperators in their analysis of demand awareness.

An interesting finding was that classification of subjects on the basis of the Staats item was more highly correlated with demand awareness than contingency awareness. This may be explained by assuming that those subjects who are demand aware will be most likely to be concerned with the contingency. If they know the contingency should influence their ratings, then the contingency is fairly salient. If they are only contingency aware, they may fail to mention the fact on their answer to the Staats item since it is not salient to them. After all, they are not aware of any relation of the contingency to any other part of the experiment, and so may fail to mention it in their answer to the Staats item. It will be recalled that five of the six contingency aware subjects were not scored as such by the Staats question. Since they were not asked directly about an irrelevant fact (the contingency), it was not mentioned in their answer.

If we assume that the lack of a contrast was responsible

for a general lowered level of awareness, then the failure to obtain conditioning after Staats-aware subjects were removed may be due to a factor possibly peculiar to this experiment. The subjects in this experiment were given the Staats question and then were not given or informed about the Page questionnaire until all had finished answering it. Since subjects were run in small groups and were therefore in close visual contact with the experimenter, they may have felt an implicit demand to continue writing, since they may have concluded the experiment was over, but were not allowed to leave. If so, more aware subjects would be likely to write something that would identify them as such, and result in the disappearance of the conditioning effect.

Since none of the hypotheses could be adequately tested in this study, the results can be interpreted in terms of any of the three positions on awareness. In Staats' case, this means 164 subjects were given the conditioning procedure, but very few, if any, conditioned without becoming aware. That those who did become aware, rated the nonsense syllable in the direction of the conditioning, is not harmful to his position. Failure to achieve conditioning without awareness here does not disprove Staats' hypothesis, but when coupled with the other studies cited, it seems damaging. It seems at best that unaware conditioning is closely tied to becoming aware. When postexperimental questioning more extensive than Staats' is used, no

conditioning is found without awareness. If subjects condition and then become aware during the postexperimental inquiry, then very few subjects condition without awareness who do not figure out the contingency and perhaps the demand at that time. One wonders where the subjects are who condition without awareness, but are unable to deduce the source of their evaluative response during the inquiry. This type of subject is lacking in all but Staats' own studies. It is quite possible that automatic conditioning of evaluative response can occur, but it either creates awareness or leads to the threshold of awareness. After all, we are dealing with a verbal stimulus and a verbal reinforcer, and awareness is closely linked with the verbal system.

The demand aware position is damaged in that it was found that conditioning can occur without demand awareness. Certainly being aware of the experimental demand did not harm conditioning, but it was not as good a predictor of conditioning as contingency awareness. Indeed, some of those demand aware may resist the demand and thus fail to show conditioning. The difference between cooperators and resisters in this study was weak, especially since subjects can look back at their semantic differential rating and retroactively decide whether they cooperated or resisted.

The most parsimonious explanation of the data was in terms of contingency awareness, based on the correlational



analysis. Some subjects became aware of the relation between the words and syllables and rated them accordingly because of the concept they came to stand for. It is quite possible, however, that these subjects were conditioned to awareness. The present experiment cannot distinguish between this possibility and the position that learning took place at a more cognitive level.

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## Appendix A

Brief  
Large  
Blue  
Stool  
Shingle  
Blanket  
Supper  
Tree  
Belt  
Outside  
Hammer  
Lawyer  
Highway  
Overcoat  
Movie  
Forward  
Backpack  
Underground  
Elephant  
Shirt  
Run  
Motor  
Apple  
Street  
Card  
Ocean  
Dog  
Cotton  
Black  
Storeroom  
Village  
Tape  
Switch

## Appendix B

CIRCLE ONE OF EACH PAIR

BRIEF OR BRIEFCASE

LARGE OR SMALL

OVER OR OVERCOAT

CAT OR DOG

RUN OR WALK

STORE OR STOREROOM

UNDER OR UNDERGROUND

OUT OR OUTSIDE

BLACK OR BLACKBOARD

VILLAGE OR TOWN

SUPPER OR DINNER

HIGH OR HIGHWAY

## Appendix C

CIRCLE ONE OF EACH PAIR

WATER OR WATERFALL

DRESS OR DRESSER

LEAF OR LEAFLET

STICK OR TWIG

INK OR INKWELL

BLOUSE OR SHIRT

GLASS OR MUG

RAILROAD OR TRAIN

KETTLE OR POT

MUD OR SAND



## Appendix D

## Modified Page Questionnaire

1. What was the purpose of this experiment and what were you supposed to do?
2. During the experiment did you ever have the idea that its purpose might be something other than what I was telling you? What?
3. Thinking back to the experiment, did you notice at the time any relationship between certain syllables on the screen and the words that were spoken?
4. If you noticed any relationship between the lists, is this something you were actually aware of during the experiment or is it something you thought of while filling out these questions?
5. Do you remember approximately when it was that you noticed this? Describe the point in the experiment at which this occurred.
6. What did you think was the purpose of the rating scales at the time you were filling them out, if anything?
7. How did you go about deciding what rating to give the various nonsense syllables?
8. Did you think that the experimenter might have expected that you would rate certain of the nonsense syllables in any certain way? Explain.
9. Was your answer to Question 8 something you were actually aware of before or during the marking of the rating scales, or something you thought of afterwards?
10. In the final learning task, what syllable was always or usually paired with the travel words?
  - a. How certain are you of this or are you guessing?  
 Guessing\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_Certain
  - b. Is this something you were aware of during the experiment or something you thought of since?  
 Please explain if necessary.

11. In the final learning task, what syllable was always or usually paired with words of pleasant meaning?
- How certain are you of this or are you guessing?  
Guessing\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_Certain
  - Is this something you were aware of during the experiment or something you thought of since?  
Please explain if necessary.
12. In the final learning task, what syllable was always or usually paired words of unpleasant meaning?
- How certain are you of this or are you guessing?  
Guessing\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_Certain
  - Is this something you thought of during the experiment or something you thought of since?  
Please explain if necessary.
13. Were you ever aware during the experiment that during the final learning task, YOF was always paired with words of unpleasant meaning or conotation?  
And, if so, were you aware of any effect this might have had on you as you marked the rating scales?  
Explain.
14. Assuming that you knew the unpleasant word and what was expected on the marking of the rating scales, rate your attitude while marking the rating scales.
- Resist the influence \_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_ Mark the right answers
15. Please make any other comments that you feel might help us understand your reaction to this experiment.
16. Have you had any previous courses in psychology such as in high school? Have you had introductory psychology in college?
17. Do you know the meaning of the term conditioning?  
If so, did you think about it during the experiment?
18. How did you feel during the experiment?
- Very interested\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_Very bored



